

## **REMARKS**

### **Administrative Overview**

In the Office Action mailed on January 14, 2010, claims 14, 22, 26 and 27 were rejected under 35 U.S.C. § 102(b) over “Transmission of a single 2.5 Gb/s subcarrier modulated channel over 300m of 62.5  $\mu$ m multimode fibre” by Tyler et al. (“Tyler”). Claims 15–21, 23–25, 28 and 29 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Tyler in view of U.S. Patent No. 6,064,786 (hereinafter “Cunningham”).

Claims 15–19, 21, 23–25, and 27–29 have been amended. Claims 14, 22 and 26 have been cancelled. New claims 30 and 31 have been added. Support for these changes can be found throughout the specification and figures as originally filed, and in particular in Figure 1 and the associated description.

We respectfully traverse these rejections in the order in which they were presented and request reconsideration of the claims in light of the arguments below.

### **Rejection of Pending Claims over Tyler, Cunningham**

All of the pending claims in this case were rejected as either anticipated by Tyler or obvious over Tyler in view of Cunningham. We have cancelled independent claims 14 and 22 and replaced them with new independent claims 30 and 31 to better distinguish the present invention from the prior art.

A proper rejection for anticipation requires the inherent or express description of each and every element of a claim in a single prior art reference. See MPEP § 2131. Likewise, for the Office to demonstrate a prima facie case of obviousness under 35 U.S.C. § 103, the supporting prior art references when combined must teach or suggest all of the limitations of the claim at issue. See MPEP § 2143. None of the cited references, either individually or in proper combination, satisfy all of the limitations of new independent claims 30 and 31. Accordingly, new independent claims 30 and 31 and the remaining claims that depend therefrom are allowable.

The problem addressed by embodiments of the present invention is the transfer of radio-frequency modulated optical signals over a multimode fibre. See Application at p. 5, ln. 11–19. Prior art systems utilize either single-mode fibre or multimode fibre where the modulated signal is downconverted to be in the fibre’s bandwidth, i.e., the bandwidth specified for baseband

transmissions, in order to provide cellular radio or wireless LAN coverage within buildings. See Application at p. 2, ln. 3–6; p. 1, ln. 8–10.

In contrast, embodiments of the present invention utilize radio-frequency signals to directly modulate a subcarrier for transmission without downconversion. See Application at p. 8, ln. 6–10. For example, a 2.5 Gbit/s on/off signal can be mixed with a 5.1GHz subcarrier; this occupies—in round numbers—the frequency band 2.6 GHz to 7.6 GHz.

Mobile phone signals and other signals intended to be carried by embodiments of the present invention are inherently narrow band and can appear at nearly any frequency in the band at any time. This means that a defect in the fibre could entirely kill a signal utilizing a particular frequency that happens to coincide with the frequencies affected by the defect. Given that embodiments of the present invention are intended to work with legacy multimode fiber, the frequencies affected by the defects are not necessarily known in advance and may vary among fibres.

Embodiments of this invention implement the realization that by selecting an offset value for the launch, a stable operating regime can be achieved for the whole population of narrowband signals transmitted using a modulated subcarrier over a fibre having defects. Accordingly, each of independent claims 30 and 31 requires: (1) modulating a laser carrier with a radio-frequency signal; (2) launching the laser into a multimode optical fibre at an offset; and (3) the offset being selected to provide a stable operating regime for both amplitude and phase in the face of imperfections in the fibre.

Tyler discusses increasing the data rate transmitted through a multimode fiber. See Tyler at p. 354. To do this, Tyler mixes input electrical data with a GHz signal, and the resultant subcarrier modulated signal is then converted into optical radiation, coupled to the fiber using an offset launch, and sent down the fiber. See Tyler at p. 354. At the other end, a second mixing operation takes place to recover the input electrical data. See Tyler at p. 355. Nothing in Tyler teaches or suggests the selection of the offset to provide a stable operating regime for both amplitude and phase in the face of imperfections in the fibre.

As has been previously discussed, Cunningham is an example of a prior art reference that transmits information utilizing baseband frequencies, i.e., frequencies from 0 Hz to the highest frequency in the signal having significant power. Cunningham discusses increasing the baseband bandwidth of a multimode fibre beyond its over-filled launch bandwidth using an

offset launch. See Cunningham at col. 2, ln. 14–16, col. 3, ln. 3–4, 15–17. Nothing in Cunningham teaches or suggests the selection of the offset to provide a stable operating regime for both amplitude and phase in the face of imperfections in the fibre.

As neither Tyler nor Cunningham teaches or suggests all of the limitations of new independent claims 30 and 31, we respectfully submit that these claims are patentable over Tyler and Cunningham, either taken singly or in proper combination, and the claims that depend therefrom are likewise patentable because they depend on a patentable base claim, and may also have additional patentable features.

**CONCLUSION**

In light of the foregoing, we respectfully submit that each of the pending claims is in condition for allowance. Accordingly, we respectfully request reconsideration, withdrawal of all grounds of rejection, and the allowance of all pending claims in due course.

If the Examiner believes that a telephone conversation with the Applicant's attorney would be helpful in expediting the allowance of this application, the Examiner is invited to call the undersigned at the number identified below.

Respectfully submitted,

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